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ITEM Nos. 22 and 31

CORDAGE INDUSTRY

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BRITISH INTELLIGENCE OBJECTIVES SUB-COMMITTEE

LONDON—H.M. STATIONERY OFFICE

CORDAGE INDUSTRY.

UNIVERSITY
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BIOS Trip No. 2043

BIOS Target Nos:
See Table of Contents.

BRITISH INTELLIGENCE OBJECTIVES SUB-COMMITTEE,
32, Bryanston Square, W.1.

TABLE OF CONTENTS.

Subject — Page Number

REPORT I. Firms visited in British Zone.

Steen & Co. Hamburg. 1 C22/2456, C31,
P. Andersen, Kiel. 5 C22/3937, C31,
Paul Stoltenberg, Kiel. 6 C22/3958, C31,
Lippman, Hamburg. 9 C31/3041, C22
Johann von Sieden, Hamburg. 10 C22/3960, C31,
A.D. Lohmann & Sohn, Hamburg. 11 C22/3961, C31
Bremer Tau-werke Fabrik Bremen. 12 C22/1446, C31
Hanfspinnerei Heinrich Ahlers, Wesermunde. 19 C22/2453, C31
C.J. Arlers, Wesermunde. 19 C22/3962, C31
Geo. Gleistein & Sohn, Bremen. 20 C22/2455, C31
P. Baumhauter, Wiedenbruck. 23 C22/1641, C31
" " Lipstadt. 26 C22/1641(a),
Seydel, Bielefeld. (Machine Makers) 28 C22/3964, C31
Hermann Crasmoeller, Neunkirchen, Nr. Wiedenbruck. 31 C22/3965, C31
Schuze Vellinghausen, Witten. (Ruhr) 34 C22/3967, C31
General Survey 35

REPORT II. Firms visited in American and French Zones.

Hanfwerke - Fussen Immenstadt. A.G. Immenstadt. 38 C22/2870, C31,
Hanfwerke - Fussen Immenstadt. A.G. Fussen. 44 C22/3968, C31,
Mech Bindfaden Fabrik Oberachern, Baden. 49 C22/2869, C31,
Hanf-Union. A.G. Schopfheim, Baden. 53 C22/3969, C31,
J.H. Bek & Co. Hanfspinnerei & Seilfabrik, Singen. Hohentwiel, Baden. 58 C22/2873, C31,
Aktienge Seilschaft Fur Seilindustrie Neckarau, Mannheim. 62 C22/3970, C31,
General Impressions of German Methods and Technique. 69
Other German Spinners. 70

TABLE OF CONTENTS (Continued)

Subject — Page Number

DIAGRAMS.

Appendix A System of Batch Application. 73
B Hemp Softener. 74
C Teaser. 75
D Machine for Spinning and Spooling Paper Yarn in one operation. 76
E Square Rope Stretching Machine. 77

PERSONNEL OF TEAM.

D.R.FROST.
H.A.ELKIN.
J.M.CAMERON.

STEEN & COMPANY.

104 Stressemann Allie.

Lokstedt Near Hamburg.

Proprietor: Mr. Walthus Luth.

Luth is a qualified Chemist and was a member of the committee appointed by the Nazi Government to investigate Raw Materials substitution for Sisal Binder Twine.

PRE-WAR OUTPUTS.

Basis of 2 shifts of 8 hours).

	Tons per year.	Raw Material.	Runnage.
BINDER TWINE	3,000	E.A. Sisal and Java.	500' per lb. B/s 90 lbs. 650' " " " 70 lbs.
SISAL ROPES.	250	E.A. Sisal.	Standard Yarn 324' per lb. Fine Yarn 520' per lb.
MANILA ROPES.	800	All grades from "K" upwards.	
Total	4,050		

PRESENT OUTPUT.

BINDER TWINE	300	Swedish Natron Paper. 450' per lb.
MANILA ROPE	80	
SOFT HEMP ROPES	100	Hungarian and Yugoslavian.
COIR.	12	Fine Coir.

PRESENT STOCK OF RAW MATERIALS.

MANILA.	75	All high Grades.
HUNGARIAN	300	
PAPER	48	
HEMP TOW	2	
	425	

BOMB DAMAGE.

Severe but some repair work has already been carried out on the buildings, and it would not be a big job to repair the buildings completely.

The plant which was wrecked, is, however useless and to bring the factory up to it's pre-war output new plant will have to be installed.

Pre-war Steen & Co. processed Hard Fibre only (Sisal for Binder Twine and Manila for Rope Yarns) but during the war the Binder Twine was spun from Paper, and nearly all the ropes were made from Hungarian Hemp, Manila being reserved for Fishing Ropes.

MANILA ROPE YARNS.

Batch Mixture.

Mineral Oil, wool grease and water.

The fibre is hand batched 12 to 15% being applied, and is then stood for 24 hours before processing.

Process.

3 passages of Goods Machines.
2 passages of Drawings.
Yarn spun on Automatics.

PRE-WAR SISAL BINDER TWINE.

Batch.

As for Rope Yarn, except 20% is applied.

Process.

4 Passages of Goods Machines.
4 Passages of Drawings.
Yarn Spun on 10" x 6" Gill Spinners.

PRESENT METHOD OF PROCESSING SOFT FIBRE.

Hemp first softened in Circular Softener, then spread on No. 1 Goods Machine and given 3 passages of long reach Drawings.

Yarn spun on Automatics.

The Yarn produced is full of "Shive" and is very unlevel.

FINE SISAL SPINNING.

Hardly touched this end of the trade and consequently know very little about "it's problems".

PLANT.

The preparing and Spinning Machinery was made by either Seydel or Beckmann, and is completely out of date. No Pad Pilers and lifting out creels have been fitted, and only one Finishing Drawing has turn tables. The Drawing Frames are fitted with an 8" diameter Drawing Roller and the leather on edge pressing rollers are all sizes.

The only Spinning Machines which escaped the Blitz are:-

1 - 40 spindle 10" x 6" Gill Spinner by Seydel. Flyer Speed 1600 R.P.M.
1 - 64 spindle 10" x 6" Roving Frame by Seydel.
15 - 2 " 10" x 8" Automatics by Seydel and Beckmann.

TOW SPINNING.

There is no Tow Spinning in these works.

ROPE WALK.

The Rope Walk is situated about two miles from the Spinning Mill and consists of three walks and a few small house machines for making ropes up to 1" circ. Both in practice and in Plant this Firm is 30 years behind U.K. Rope Makers.

They have two Electric Travellers, but they are not a good job, the machines being too lightly constructed.

They do not use a Top Cart or Tails, the Rope Maker holding the Top in his hand.

The House Machines are old and cannot compete with a Haskell Dawes.

The Ropes made on the house machines are clipped as they are laid. There is nothing special about this, the ropes, before passing the cropper, have the hairs ruffled by passing over a loose pulley bound with a kind of emery cloth. The finished ropes from this machine look quite good.

COIR WINDING.

The Coir hanks are put on to large diameter Iron Swifts and the Coir Yarn is spooled on to a two spindle spooler, the size of each spool being 13" x 13", and very good spools they are too.

There are three of these machines in these works.

The machine details are:-

Length 12 ft. Width 3 ft. Height 3 ft. 6 ins. Gross Weight 1600 lbs..
Machine Maker C. Oswald Liebscher of Chemnitz.

These machines are possibly 30 years old, but they are a good job.

BINDER TWINE SPOOLING MACHINES.

These look efficient machines and have been specially made for spooling paper Binder Twine. I do not think they are robust enough for spooling Sisal Binder Twine. As a matter of interest I set out below the details of these machines.

Machine Maker - Schweiter A.G., Horgen - Zurich.
Each machine has 6 spindles and makes the following size spool:-

6¼" x 7½" dia. weighing 5½ lbs.

Production per 6 spindles per 8 hours on Paper Twine.

460 ft. per lb. - 660 lbs.

PAPER BINDER TWINE.

Steen & Co. spin quite a good 2 ply Paper Binder Twine, 460 ft. per lb., but their methods are not as good as those employed by other German Spinners.

P. ANDERSEN.

Kiel Wellingdorf.
Klansdorfer. Weg 163.
Kreis Kiel.

These works are completely bombed-out, and all the Hard Fibre Preparing Machinery has been sold as scrap.

PRE-WAR OUTPUTS.

	Tons per year.
Sisal Binder Twine.	750
Manila Ropes.	750
Total.	1,500

Largest rope made - 22" circ. Manila.
Finest yarn spun sisal - 750' per lb.

Completely wrecked spinning machines left in burnt out buildings.

1 - 64 spindle 9" x 4½" Gill Spinner made by Seydel.
1 - 48 " 9" x 4½" " " " " "
1 - 40 " 10" x 6" Roving Frame " " Fairbairn Lawson 1914.
1 - 32 " 10" x 6" " " " " " " 1912.

Some of the scrapped preparing machines had been supplied by Fairbairn Lawson before 1914.

Of the Rope Walk there was not even a trace left.

This firm prior to the Blitz had been spinning Paper Binder Twine but there was nothing special about their methods.

Future of the Works.

Hard to forecast; the Factory stands on a good site and a Railway Siding runs into the Factory.

PAUL STOLTENBERG.

Spinnerei U. Seilwerk.

Krous Hagen.

Near Kiel.

Person interviewed:- Paul Stoltenberg.

These Works have escaped the bombing.

PRE-WAR OUTPUTS.

	Tons per year.
Sisal Binder Twine.	400.
Manila Ropes.	150.
Sisal Ropes.	150.
Total.	700.

Worked 2 8-hour shifts. Employing 35 workers per shift.

PRESENT STOCKS OF RAW MATERIAL.

Manila.	(Mostly high grades)	8 Tons.
Sisal	B. E. A	3 "
Hungarian.		12 "
Italian.		1½ "
	Total	24½ "

Binder Twine now spun from Hungarian.
Rope made from Hungarian.
Fishing Ropes made from Manila.

Future of Factory.

Governed by supply of Raw Materials, and coal for the two small Steam Engines which drive the works.

PREPARING MILL.

Machinery in Situ.

1 Long reach Goods Machine by Seydel.
1 American Apron Head Double Chain Hackler by Watson.
4 long reach single head Drawing Frames.

All the above are old - no Pad Pilers, lifting creels or turn tables fitted.

Process.

Manila Rope Yarn
Fibre hand batched with 8% Pure Mineral Oil stood 24 hours before working.
3 passages of Goods Machines.
3 passages of Drawing Frames.
Yarn spun on old fashioned Automatics.

BINDER TWINE.

Sisal hand batched with 20% Pure Mineral Oil stood 24 hours before working.

3 passages of Goods Machines.
3 passages of Drawing Frames.

Yarn Spun on a 10" x 6" Gill Spinner.

Finished Twine contains about 10% oil.

SPINNING MILL.

1 - 24 spindle 10" x 6" long reach Gill Spinner by Seydel.
Flyer Speed 1500 R.P.M.
1 - 40 " 9" x 4½" Roving Frame by Seydel.
Flyer Speed 800 R.P.M.
14 - 2 " 10" x 8" Automatics by Seydel.
Flyer Speed 400 R.P.M.

Roping Yarn Spun - 324 ft. per lb.
Sisal Binder Twine - 500 ft. per lb.

ROPE WALK.

Two Walks - very old no Top Cart or Tails. Machines on the light side as regards construction - very small Gab Wheels.

Largest Rope made 13" circ. 3 Strand.

There are also a couple of very old small house machines to make up to 1" circ. Rope.

This Firm is very out of date.

LIPPMANN OF HAMBURG.

Rope makers only.

3 Rope Walks.
10 spindles of Twisters (Lawson type).
1 Rope Making Machine for sizes to 1¼" circ.

This firm is run by two brothers who are very energetic men.

The Plant is out of date compared with British standards.

PRE-WAR OUTPUT.

900 tons per annum.
All sizes and qualities of yarn purchased from:-

Steen & Co.,
Lokstedt,
Hamburg.

and

Woltemade & Sohne,
Mechanische Hanfspinnierie,
und Tauwerkfabrik,
Stade on Elbe.

Largest Manila Rope made 9" circ.
" Coir " " 24" "

PRESENT OUTPUT.

	Tons per year.
Hemp.	124.
Manila.	68.
Coir.	12.
Herculean Rope.	4.
Total	208

Herculean Rope is a 6 strand Rope with a small wire core strand in each strand, generally 3" circ. and is used for Fishing.

This Firm's main customers were the Fishing Industry for which they supplied Manila, and River Shipping Firms.

JOHANN VON SIEDEN.
MOORBURG.
HAMBURG.

This is a very small affair (rope-making only) run by Father and Son who do everything, including the rope-making.

The Rope Walk (only 1 set of machines) runs out into an orchard from the back of Sieden's house.

PRE-WAR OUTPUT.

300 tons per annum.

Largest Manila Rope made 9" circ.
" Coir " " 24" "

Yarn purchased from:-

Steen & Co., Lokstedt, Hamburg, and
Woltemade & Sohne of Stade on Elbe.

a. A.D. LOHMANN & SOHN.

MOORBURG.

(BEZ HAMBURG).

This is another very small affair, even smaller than Siedens. Only one Rope Walk.

PRE-WAR OUTPUT.

50 tons per annum.

Yarn purchased from:-

Steen & Co., Lokstedt, Hamburg, and
Woltemade & Sohn of Stade on Elbe.

PRESENT OUTPUT.

32 tons per annum all sizes and qualities.

GENERAL NOTE ON THE HAMBURG SMALL ROPE MAKERS.

It may seem strange that Rope-making on such a small scale and by such antiquated methods could be a profitable business, but I suppose these people buy their yarn on favourable terms, and of course by actually making the rope themselves coupled with the fact that the three rope walks are situated in the country thereby paying very small rates, their overhead charges are practically nothing.

Nearly all their rope is sold in the Hamburg Area for the Fishing Industry and for Dock and River work.

BREMER TAU-WERKE FABRIK.

Proprietor: F. Tecklenborg, Bremer, GROHN.

Tecklenborg, who pre-war was Chairman of the German Hard Fibre Spinners Association speaks English well, also has a good knowledge of England.

WAR DAMAGE.

Very little. Rope Walk damaged by Shell Fire during the assault on Bremen in April 1945. This being repaired now.

PRE-WAR OUTPUTS.

Production Basis (2 shifts of 8 hours per day).

	Tons per year	Raw Material
Binder Twine	4500	B.E.A. Sisal.
Rope & Trawl Twine	1800	Good Manila.
Soft Hemp	250	European Hemp.
	6550	

PRESENT OUTPUT.

Binder Twine.	3000	Swedish Natron Paper
Rope & Trawl Twine Soft Hemp	800 ?	Manila & European European Hemp.

Manila is being used for Trawl Twine and Fishing Ropes.

RAW MATERIAL STOCKS.

	Tons.	
Manila.	130	Mostly High Grades
Sisal	10	
True Hemp	500	
Paper	50	
	690	

FACTORY.

Hard Fibre Preparing and Spinning Mill.

The best laid out Mill I have ever seen, the Mill being 60 feet wide x 520 feet long, all the preparing machines being head to tail and very generously spaced. The Mill has three complete preparing systems, but the goods machines run at a very slow speed, the output per goods machine being three tons per 8 hours. All the goods machines are fitted with Pad Pilers and Turn Tables.

The Drawing Frames, nearly all of which have been made by Lawson of Leeds are 40 years old and have no Turn Tables or Pad Pilers. The pressing rollers on the Drawings are only 20" diameter.

The slivers on the Preparing Machines are 50% lighter than the corresponding slivers on British Preparing systems.

The pinning per sq. ft. with the exception of the No.1.Drawing which is very fine, is approximately the same as that adopted in the U.K. There is no advantage in having this No.1 Drawing so fine pinned, in fact it is a disadvantage as when working Manila the machine is continually dragging.

BATCH.

The Batch is purchased from a firm called DIRCH und SCHROEDER. 50 BACH STRASSE, BREMEN, and is mixed in the Mill as follows - 2/3 Batch, 1/3 Spindle Oil and forced fed on to the No.1. and No.2. Goods Machines at a temperature of 50°, 15% being applied to Rope Yarns and 20% to Sisal Binder Twine. There is nothing special about the Batch but the method of application to insure greater and more even distribution is quite good.

The method of application is as follows:-

The Batch is pumped from the storage tank to tanks above the first and second Goods Machines. In each tank there is a 4" diameter Hollow Steel Roller with a longitudinal slit, which revolves in the tank picking up the Batch. Against the Steel Roller there is a sheet of metal which acts as a scraper. The Batch runs down this scraper, the bottom of which has had it's edge cut and bent like the setting of a wood saw. The Batch is thus diverted two ways as per sketch. This division by the same method is again repeated thus giving four separate feeds on the slow chains of the No.1. and No.2. Goods Machines.

Sketch to Illustrate above Description. See Appendix 'A'

Process of Rope Yarn and Binder Twine.

3 passages of Goods Machines.
4 " " Drawing Frames.

This Firm do not believe in further passages of Goods Machines for either Sisal or Manila, as they maintain further passages tend to spoil the sliver.

Spinning.

Automatics were discarded in 1926 in favour of Gill Spinners for all Yarns and the Mill is now commissioned as under.

2 - 24 spindle 10" x 6" Gill Spinners by Mackie 1935.
2 - 24 " 10" x 6" " " " - Beckman.
1 - 56 " 10" x 6" " " " " (Gear Driven Flyers).
1 - 18 " 10" x 8" " " " Seydel.
1 - 30 " 10" x 8" " " " Liebscher of Chemnitz. (A very heavy cumbersome machine).
2 - 70 " 8½" x 4" Roving Frames by Lawson of Leeds.

Used for spinning Manila Trawl Twine Yarn 2360 feet per lb.

1 - 56 spindle 10" x 5" Gill Spinner by Seydel.
2 - 32 " 10" x 5" Roving Frames by Lawson of Leeds.
1 - 80 " 6" x 3½" Roving Frame by Lawson of Leeds.

Used pre-war for spinning 3 lea Sisal from Java.

The Rope Yarn is spun 324 feet per lb. on the 10" x 8" Gill Spinners.

Pre-war the 500 ft. per lb. Sisal Binder Twine was spun on 10" x 6" Gill Spinners.

3 Lea Sisal

The Raw Material used is Cantala and is processed as follows:-

3 passages of Goods Machines.
5 passages of Drawing Frames and the yarn is spun on a 6" x 3½" Roving Frame.

Tecklenborg stated that he considered a better process would be to spread the fibre on a Hemp Spreader, thus cutting out the Goods Machine Passages and then prepare the fibre on a 60" reach system with fine pinning.

I am not sure what batch he used for this process but believe it was bought from his batch maker DIRCH und SCHROEDER of Bremen.

Tecklenborg also told me that the Belgium Spinners had spun Sisal down to 4 and 5 lea, but Germany had been unable to discover their secrets.

Regarding the future of Fine Sisal Yarns (above 3 lea) Tecklenborg was of the opinion that the extra cost of preparation and high power cost would bring yarn spun from Cantala too much into competition with Soft Hemp Tows to make it a profitable proposition.

Sisal Twine Polishing.

Tecklenborg reckoned his Polished Sisal Twines were pre-war the best in Germany, and the samples he showed me were certainly very good.

His method was -

(1) Twine clipped before polishing.
(2) No water bath used.

The Twine having been passed over the starch roller was drawn between two cool cylinders, then dried on ordinary steam heated cylinders, one cylinder having it's surface slightly smeared with wax.

Starch Mixture:-	4 litres of water. $\frac{1}{2}$ kilogram Potatoe Starch. 1% of above mixture DEXTRIN	Polishing machine used was 30 years old. Very similar to our Soft Hemp Twine Polishers.

Trawl Twine.

A really fine job is made of the Trawl Twine and even to-day the finished article leaves nothing to be desired.

Details of Process:-

Material used high grade Manila possibly nothing lower than "F".
Fibre hackled by hand taking out 15% of Tow.
Prepared through 3 Goods and 5 Drawings. 12% of Batch being applied.
Yarn spun on 8½" x 4" Roving Frame 2360 ft. per lb.
Twine laid on Vertical Laying Machine 10" x 8" Bobbin.

ROPE WALK.

Comprises six walks which in no way approach British development.

HOUSE MACHINES.

Machines are few in number and are over 30 years old, being constructed on the Bulmer principle.

TWISTING OF CORDS.

In the main Automatic Heads, but they have one 18 spindle 11 x 7½" Auto Doffing Mackie Machine.

LAID CORDS.

Vertical Type Rope Driven Flyers, 8 spindles per machine 10" x 8" bobbin used for laying Trawl Twine. Approximately four machines all told.

SOFT HEMP MILL.

Three large Breaker Cards, possibly 40 years old, and five full circular hopper feed Cards by Lawson with Drawing Heads supplied by Liebscher of Chemnitz.
2 - "Mechanical Man" Hacklers.
Drawing Frames Supplied by Lawson of Leeds.
1 - 50 spindle 8" x 4" Roving Frame by Lawson
1 - 56 " 8" x 4" " " " "
1 - 64 " 9" x 4½" " " " "

This Mill is rather the "lame duck" of the Factory and is not up to British practice, and it struck me that this Firm was not very knowledgeable as regards Soft Fibre Spinning, especially the finer counts.

TAR HOUSE.

Method. Finished Ropes stored in steam heated room for 48 hours then drawn direct through the tar kettle and coiled in one operation. The coils are then returned to the "Hot Room" for 48 hours.

I saw one or two coils in the "Hot Room" and they looked a first class job.

PAPER BINDER TWINE.

These people had developed Paper Binder Twine to a fine art, and claimed to be the only people in Germany who were spinning a single ply Paper Twine 600 ft. per lb. Their method was:-

The Swedish Natron Paper is cut into strips 2.45" wide and spun either on Automatics Gill Spinners or Roving Frames.

Tecklenborg stated that the reason other people had failed to spin Binder Twine single ply was that they could not make it sufficiently elastic. He had got over this by crimping the twine through a double pair of fine fluted rollers instead of a single pair in the final drying polishing and crimping process.

This single ply Binder Twine is of course a great step forward as it reduces the production and power costs very considerably. P. Baumhauter of Battenhorst reckons the Wages Costs of Paper against Sisal Binder Twine are about equal, but these figures are based on a 2 ply Paper Twine, so I think it is safe to assume that a single ply Paper Twine can be produced at least 25% cheaper than it's Sisal counterpart as regards direct labour and power. It is also true to state that the supervision needed in the production of a Paper Twine is less.

The spinning of Paper looks such a simple process that one is inclined to be led astray as regards costs but I would point out that 460 ft. per lb. Paper Binder Twine has 25 turns per foot as against approximately 13.5 for 500 ft. Sisal Binder Twine.

Tecklenborg thinks that Paper Binder Twine given a reasonable chance as regards price of raw material has come to stay as the twine is dead level and the German Farmers are not only used to it, but like it.

The price of Natron Paper pre-war was 40/6d. per cwt. C.I.F. Hamburg or Bremen, which does not, of course, compare very favourably with the pre-war price of Sisal.

Tecklenborg is the only German Spinner I met who held the view that the German Farmers preferred Paper to Sisal Binder Twine, and this may be a biased view as he is ahead of his competitors in Paper spinning.

PRE-WAR GERMAN WAGES.

I discussed the question of wages with Tecklenborg and pre-war he was paying in general wages approximately 10% lower than we paid in London, all this being based on the pre-war Rate of Exchange of ten marks to £1.

PRESENT LABOUR POSITION.

Tecklenborg complains that his present labour is not good and is in short supply. In short supply yes, but the standard of diligence looked very good to me.

GENERAL SURVEY OF BREMER-TAUWERKE FABRIK.

This Firm is the biggest individual ropemaking concern in Germany and I was very impressed with both the management and the lay-out of the Factory. I think if Tecklenborg had been able to buy British machinery and had been backed, as we are backed, by first class machine makers he would have been "as up to date" as any Firm I have seen.

Tecklenborg is well aware of the superiority of British machines, and is only too sorry that he was only able to purchase so few machines from Britain before the War.

Tecklenborg also is a believer in buying good quality fibre and does not believe in buying cheap grades of fibre which he says simply fall out of the preparing machines and will not spin and then make a poor Rope into the bargain.

HANFSPINNEREI HEINRICK AHLERS WESERMUNDE-LEHE BREMEN.

I did not visit these works, but Tecklenborg of the Bremer Tau-Werke gave me the following information. Very small firm, who have been blitzed during the War. Pre-war they made no Binder Twine. To-day they make 300 tons of Paper Binder Twine per year.

PRE-WAR OUTPUT.

600 tons of Ropes per year.

C.J. ARLERS, WESERMUNDE.

Very small firm who make both Wire and Hemp Rope.

GEO. GLEISTEIN & SOHN,
TAUWERKFABRIK,
VEGESACK,
BREMEN.

I met Herr Rasth who is joint Managing Director with his brother.

WAR DAMAGE. Nil.

PRE-WAR OUTPUTS.
Output per Year.

Binder Twine from E.A. Sisal	300 tons	Worked 2 shifts of 8 hours each.
Manila Rope	400 "	
Trawl Twine	100 "	
Hercules Rope	80 "	
Cords	60 "	
	940 "	

PRESENT OUTPUT.

Binder Twine from Paper	200 tons	Seriously handicapped by Raw Material and Labour shortage.
Rope.	100 "	
	300 "	

PRESENT STOCKS OF RAW MATERIAL.

Manila	11 tons.	(10 tons of which is owned by Arlers of Wesermunde).
Sisal	-	
Italian	34 "	
Yugoslavian	65 "	
Hungarian	13 "	
Tow	7 "	
	130 "	

FACTORY.

Rather a jumbled up affair, but the Rope Walk is a good building with a concrete floor containing three rope walks.

HARD FIBRE PREPARING.

Batch.

Manila. Batch bought from Groner & Co., Bremen, already mixed. 15% - 20% applied to No. 1 Goods Machine.
Binder Twine. 20% Rope Yarn Batch applied by hand and the Sisal is stood for 24 hours before processing.

Process.
Rope Yarns.

3 passages of Goods Machines.
4 passages of Drawings.

Gill spun on a 24 spindle 8" x 11¼" long reach Gill Spinner by Beckmann of Bielefeld.

Binder Twine.

4 passages of Goods Machines.
5 passages of Drawings.

Gill spun on various Gill Spinners 10" x 6" or 10" x 8". Machines made by various makers.

SOFT HEMP LINE YARNS.

Process.

Hand hackled, then fed on to a Watson Single Chain Spreader, 2nd. passage Watson Single Sheet Spreader then five passages of long reach Drawings.

Nearly all the Preparing Machines are very old, some being 55 years old, but the Goods Machines are fitted with Turn Tables and Mackies "Pad Pilers".

There is one modern No.1 Drawing 1½ pitch of screw, long reach machine by Mackie, about 1936 vintage. The other Drawings have been made by Beckmann or Seydel; and Gleistein's people say British machinery by either Mackie or Lawson is far superior in every way, and this is certainly true.

SPINNING MACHINERY

The Gill Spinners are not the Automatic Doffing Type, and cannot be compared to Lawsons or Mackies in construction or quality.

I set out below a schedule of the Spinning Plant in these works.

1 - 24 spindle 11¼" x 8" Long Reach Gill Spinner, Flyer Speed 1600 R.P.M. by Beckmann.
1 - 48 " 10" x 6" Long Reach Roving Frame by Beckmann.
1 - 24 " 10" x 6" Long Reach Gill Spinner by Seydel.
1 - 16 " 8" x 4" - 42" Reach Gill Spinner by Beckmann.

For spinning up to 2,000' per lb. Manila Trawl Twine Yarn.
1 - 32 spindle 10" x 4½" Roving Frame by Hartmann of Dresden.
X 1 - 32 " 10" x 5½" Gill Spinner by Lawson of Leeds.
1 - 32 " 10" x 5½" Roving Frame by Lawson of Leeds.
1 - 30 " 9" x 4" 50" Reach Gill Spinner by Beckmann.

X This machine was an old Roving Frame and has been converted to a Gill Spinner by Beckmann.

P. BAUMHAUTER.

HANFSPINNEREI & SCHNURENFABRIK.

BATENHORST Near WIEDENBRUCK, HANOVER.

Interviewed: P. Baumhauter - Proprietor.

This Firm are the largest Binder Twine Spinners in Germany.

PRE-WAR OUTPUT.

(Working Basis 2 shifts of 8 hours).

Three Mills at:-	
WIEDENBRUCK. LIPSTADT. GENTERHIN (Russian Zone).	10/12,000 tons of Sisal Binder Twine 2,000 tons of Sisal Packing Cords and Manila Yarns for Wire Rope Cords.

The Wiedenbruck Mill is the biggest and the best equipped.

PRESENT STOCK OF RAW MATERIAL.

MANILA	2 tons.
ITALIAN	200 tons.
PAPER	50 tons.

PRESENT OUTPUT.

Binder Twine from Paper - 2,400 tons per year at the Wiedenbruck Mill.

Paper Packing Cords are made at the Lipstadt Mill.

Baumhauter does not know what has happened to the Genterhin Mill, but a rumour has come through to the effect it has been restarted.

WIEDENBRUCK MILL.

DESCRIPTION OF WORKS.

Not a very good lay-out - the machines being too cramped.

WAR DAMAGE. Nil.

HARD FIBRE BINDER TWINE PREPARING (2 systems).

Batch.

100% Pure Mineral Oil. Fibre hand batched and allowed to stand 24 hours before processing.

Process.

4 passages of Goods Machines.
5 passages of Drawing Frames.

The fourth and fifth Drawings are short reach machines, the reach being 55" and 42" respectively.

The Finisher is a very fine Pinned machine, the details of which are :-

Pitch of Screw 1", 2 rows of pins per gill, 15 pins per row, width of gill 5½". The diameter of the Drawing Roller is 4", thereby giving a very short nip.

Turn Tables have been fitted to all the Goods Machines, but have not been fitted to the Drawings.

SPINNING.

All types of Gill Spinners and Roving Frames made by Seydel and Beckmann, none of which are of any interest to the U.K.

The Binder Twine was spun on 10" x 6" Gill Spinners.

2 LEA SISAL.

This was spun from JAVA, but they preferred CANTALA from which they hackled the Tow on a Circular Hemp Hackler.

BATCH.

1% Special Oil obtainable from Dirch and Schroeder of Bremen, 99% water was used. This batch was mixed cold and 15% was applied to the Fibre at 60°F. The Fibre was hand batched and allowed to stand 24 hours.

Process.

4 passages of Goods Machines.
5 passages of Drawings, the fourth and fifth Drawings being short reach machines, identical for reach and pinning as the fourth and fifth Drawings in the Binder Twine Preparing System.

The Yarn was spun on a 42" reach 9" x 4½" Gill Spinner. Pinning details as follows:-

8 pins per inch, pins being 1⅜" long, 16 S.W.G.

SISAL TWINE POLISHING.

This Firm made and patented a special machine for polishing Sisal Twine, and I understand either Mackie or Fairbairn now make this machine under licence.

The machine has been taken to pieces as it has not been used since 1938. However, after having studied the Drawings and having had a look at the pieces, Baumhauter volunteered the information that he had considerably improved the machine since taking out his patent and I am therefore pretty certain that the machine in his works is a better machine than the ones made under licence in the U.K.

Baumhauter supplied the following information about this machine:-

Production on 3 ply 100 yds. per lb. - 9¾ cwt. per 10 hours.
Starch Mixture - 70 litres of Water.
15 lbs. of Dextrin

Above mixed cold then boiled and thickened up by adding Potatoe Flour.

SOFT FIBRE.

Baumhauter buys German Hemp in straw form, which having been dried is passed through two long Jute Softeners to knock off the bark. The fibre is then hackled on a Circular Hemp Hackler and prepared on the long reach Hard Fibre Preparing System. The fibre is not strong, about half the strength of P.C. Italian. The yield from the straw is 15%. I gather the fibre this Firm is using was grown in Westphalia, but only in small quantities.

The Soft Hemp Mill is not clever, and to my mind is not properly understood.

There is one rather novel machine for reclaiming Soft Fibre from Card Waste, the reclaimed waste afterwards being sold to upholsterers, it being too short to spin.

KNOT CRUSHING MACHINE.

This simply consists of two heavy steel rollers about 15" diameter, exactly like a mangle. The rollers run hard one on top of the other. The knots are certainly crushed very well.

PAPER BINDER TWINE.

Baumhauter was a bit slow "off the mark" in developing Paper Binder Twine, but he has made a belated effort and is now spinning very efficiently a good 2 ply twine, but he is well behind the Bremer Tau-Werke.

LIPSTADT WORKS.

The Mill at present is spinning Paper Packing Cords from German Kraft Paper.

BOMB DAMAGE. Nil.

PRE-WAR this Mill spun Sisal Binder Twine.

Process

4 passages of Goods Machines.
4 passages of Drawing Frames. No. 3 and No. 4 Drawings being short reach machines.

DETAILS NO. 3 DRAWING.

3 head, 6 gills per head,
Reach 42".
Width of gill 4¾".
19 pins per gill.
Pitch of bar 1¼".
Diameter of Drawing Roller 6".

DETAILS NO. 4 DRAWING.

2 head, 6 gills per head.
Reach 54".
Width of gill 3¾".
15 pins per gill.
Pitch of bar 1".
Diameter of Drawing Roller 6".

SPINNING MILL commissioned as under:-

6 - 40 spindle 10" x 8" Gill Spinners by Seydel.
1 - 40 " 10" x 6" " " " "

PAPER PACKING CORD.

Material used - German Kraft Paper.

Type A. Cut into widths of 4¼" and spun single ply from the roll on automatics. Paper Yarn then polished and dried in one operation.

Type B. Cut into widths of 1.5/16" then folded on an ordinary 6 spindle horizontal spooling machine by passing the paper through a tin bell mouth conductor. Folded paper then spun on a Roving Frame. The paper yarn is then twisted 2 ply on automatics. Afterwards it is polished and dried.

SEYDEL & CO.

BIELEFELD.

NR. HANOVER.

Person interviewed: Managing Director.

This Firm are the largest makers of Hard Fibre Machinery in Germany, but small in comparison with U.K. Manufacturers.

The Works, which have escaped bomb damage, are practically at a "stand still"; they have however, an order from a Spinner in Norway for one long reach Goods Machine, one long reach Drawing and one long reach Gill Spinner, and I understand Military Government are going to grant them power and coal to execute this order.

I examined one partly finished Goods Machine which was standing in the Erecting Shop, and my earlier opinion was confirmed that they are a long way behind Fairbairn and Mackie.

I particularly noticed that a great many of their castings were of a poor quality.

Gill Spinner Construction.

In all machines of this type they are a long way behind U.K. Makers, particularly in their Auto Doffing design and Drag arrangements.

Before I left Seydel & Co. I discussed at some length German Soft and Hard Fibre Spinners, and I set out below the information I obtained:-

J.H. BEK & CO. • Hanfspinneree and Seibfabrik, Singen, Hohentwiel, Baden (French Zone).

Pre-war spun Sisal Binder Twine and Manila Rope Yarns which they processed into Rope.

ADOLF DEICHSEL. A.G. Hindenburg (Russian Zone).
Rope-makers and Spinners - spinning Manila, Sisal & Soft Hemps.

EBERBACHER DAMPFSEILERWAREN FABRIK, OTTO SIEBECK EBERBACH.
Sisal Binder Twine only.

FELTEN & GUILLEAUME Cologne (British Zone).
Closed down before War now at SCHRETZHEIM DILLINGON. Only making Soft Hemp Yarns.

H.C. FISCHER GMBH TAUWERKFABRIK STETTIN GRABOW - (Russian Zone).
Sisal Binder Twine (Large Firm).

AUGUST GREVE KOM GES. LINDAU AM HARZ.
Jute and Soft Hemp Spinners.

GRUSCHWITZ TEXTILWERKE, NEUSALZ (Oder) and Grwenberg (Russian Zone).
Sisal Binder Twine Soft Hemp and Flax Spinners. (A large concern).

J.H. HACKMANN - HALLE.
Soft Hemp Spinners. Very small.

HANFWERKE FUESSEN - IMMENSTADT. (French Zone).
At Immenstadt works. Soft Hemp and Sisal Binder Twine.
" Schlotheim " Sisal Binder Twine only.
" Bamberg " Soft Hemp only.
" Mannheim " Manila Rope and Sisal Binder Twine,
this latter works now destroyed. The above Firm are the largest Soft Hemp Spinners in Germany.

HANF - UNION A/G SCHOPEHEIM. (French Zone).
Soft Hemp Spinners only.

KABELFABRIK DANZIG.)
" " LANDSBERG.)
Manila Ropes and Sisal Binder Twine.

MECH SEILERWARENFABRIK GUSTAV LORENZ ANNABERG 1/ERZEBIRLE.
Spinning Sisal for Clothes Lines and Packing Cords.

MULLER & WEIMER, SCHLOTHEIM/TAURINGEN.
Spinning Sisal for Clothes Lines and Packing Cords.

ERNST LAUBE, SCHLOTHEIM.
Spinning Sisal for Clothes Lines and Packing Cords.

MECH BINDFADENFABRIK, OBERACHERN.
Soft Hemp Spinners.

SEILWERKE HEINR PUTH, BLANKENSTEIN, RUHR.
Sisal Binder Twine Spinners.

F. & H. RALENKOTTER, Wiedenbruck (Hanover).
Very small Firm. Sisal Binder Twine 800 tons per annum.

I.M. SCHLESINGER BEDZIN.
Sisal Binder Twine and Manila Trawl Twines.

MECH TAUWERKFABRIK E SCHUIRING & CO. WESSERMUENDE (BREMEN).
Closed down pre-war.

GUSTAV THIEMANN & SOHNE, G.M.B.H. RHEINE.
Binder Twine Spinners. Partly destroyed in the War.

WOLTEMADE & SOHNE, STADTE, (near KIEL).
Binder Twine and Rope Yarn Spinners.

THOMAS SONTHEIMER MECH TREIBRIEMENWE, BERGI & SEILFABRIK, WEIGARTEN.
Very small Firm of Binder Twine Spinners.

ALOIS WOETZI LINZ.
Very small Firm of Binder Twine Spinners.

J.W. KROENER, AUGSBURG.
Closed down pre-war.

VEREINIGTE TAUFABRIKEN G.M.H.H. EMMERICH. (Branch of United Rope Works of Rotterdam).

Binder Twine Spinners. Completely bombed out, now trying to obtain licence to re-build.

INTERNATIONAL HARVESTER CO. NEUSS.
Sisal Binder Twine Spinners. Pre-war output 3,500 - 4,000 tons per year. Bombed to a certain degree. Present estimated possible capacity 1,500 tons per year.

E. & B. SCHROEDER, LANDSBERG.
Soft Hemp Manila Ropes and Sisal Binder Twine. Large Firm. Now taken to Russia for reparations.

TOTAL PRE-WAR GERMAN PRODUCTION.

Sisal Binder Twine	45,000	per year.
Manila Rope and Trawl Twine.	6,000	" "
	51,000	" "

HERMANN CRASMOELLER,
NEUENKIRCHEN,
NR. WIEDENBRUCK,
HANOVER.

Person interviewed:- Hermann Crasmoeller.

Hermann Crasmoeller and his Father had been hand spinners in Neuenkirchen, but by hard work saved enough money to build this Factory which is quite a reasonable place and was put in commission in 1926.

PRE-WAR OUTPUTS.

Sisal Binder Twine	1200	tons	per	year.	2 shifts of 8 hours per day.
Sisal Packing Cords	450	"	"	"	
Agricultural Ropes	200	"	"	"	
Manila Herculean Ropes.	100	"	"	"	
	1950	"	"	"	

PRESENT RAW MATERIAL STOCKS.

European Hemp	54	tons
German Paper.	158	"

Works at the moment are virtually closed because Crasmoeller is not allowed coal, but when coal is permitted he will be able to manufacture 2100 tons of Paper Binder Twine per year.

BOMB DAMAGE. Negligible.

PROCESS.

Batch. Crasmoeller used a special type of oil, treated with a spirit, which was obtained from an unknown firm in Stettin and Breslau. Some obscurity existed as to the mode of purchase which would seem to have bordered on the Black market. This oil was mixed with water in the proportion of one of oil to thirty of water and the fibre hand batched.

African Sisal	5%
Java	7%
Mexican	9%

This same batch was used for Binder Twine and Packing Cords, and the fibre was processed as soon as it was batched.

The Oil Containers were marked with the letters C.T. with a different serial number for each consignment and it was obvious that the Sisal spinning was tremendously improved by its use.

BINDER TWINE AND 2 LEA SISAL PREPARING.

Fibre - African Sisal.

3 long reach Goods Machine passages.
1 (No. 4 Goods) short reach Goods Machine passage.
5 passages of Drawings, all short reach, 1st. Drawing being 52" reach, Finishing Drawing 48" reach.

Binder Twine spun on 3 - 24 spindle 10" x 6" 42" reach Gill Spinners.

2 lea Sisal spun on 1 - 24 spindle 9" x 4½" 42" reach Gill Spinner (each spindle has a separate motor). Pinning details - 17 pins (single row) over 2" gill ⅞" pitch of Bar. Flyer Speed 3500 R.P.M.

All the above made by Seydel.

Crasmoeller says pre-war he had started to spin 4 lea yarns from African Sisal and thought African Sisal superior to either Java or Cantala for the job.

The fibre was prepared over the Binder Twine Preparing System but to do the job properly the fifth Drawing, according to Crasmoeller should be a 42" reach machine as against the present 48" reach and the Gill Spinner 30" reach with a 6" x 3" bobbin, and the Fallers inclined instead of horizontal.

I do not recommend the Preparing System from these works to be brought to U.K. as they are made by Seydel and are not as good as ours, also all the pinning has been altered to accommodate soft fibre which was used during the War.

POLISHING SISAL.

Nothing special about this, water and potatoe flour being the starch. The actual polishing machines have now been scrapped.

SISAL TOW.

Pre-war Sisal Tow was spun.

Prepared over 2 Cards 2 Drawings and spun on a 24 spindle Gill Spinner, 12" reach, 10" x 6" bobbin. Pinning details - double row of pins, 17 per row over 2" gill. Pitch of Bar ¾".

Yarn spun 670' per lb.

All the Card laggings have now been altered to card soft hemp.

SCHUZE VELLINGHAUSEN.

WITTEN

(RUHR).

Managing Director - Herr Bommern.

This is a small plant which is completely bombed out, the machinery being only fit for scrap.

When in commission the Factory had one Hard Fibre Preparing and Spinning System and a small Soft Fibre Plant, a few Balling and Spooling Machines, a couple of Polishing Machines for Sisal Twines and one Rope Walk.

I estimate the pre-war output per year as under:-

Sisal Binder Twine	800 tons.
Sisal Twines.	100 "
Rope.	200 "
	1100 "

GENERAL SURVEY OF GERMAN HARD FIBRE INDUSTRY.

(Binder Twine Cords and Rope-making)

In the preparation and spinning of Yarns (with the exception of 4 lea Sisal) Germany is a long way behind U.K. Spinners, and I attribute this to the following reasons:-

(1) Restrictions of Imports of Sisal and Manila owing to currency restrictions. In fact in 1938 the German Government banned the use of Sisal for Packing Cords and tried to abolish Binder Twine, but in the latter case the Binder Twine Spinners and Farmers were able to prove that the amount of money saved by not importing Sisal for Binder Twine would be lost many times over by the extra labour needed to tie up the Harvest by hand. Also of course Germany has had no Sisal during the War, and very little Manila, the latter being pre-war stocks and about 900 tons which came in through Russia before 1941.

(2) The German Cordage Industry is not backed by first class machine makers as is the case in the U.K. The machinery made by Seydel Beckmann and Liebscher is not only inferior in design to U.K. made machinery but a poorer quality of metal is used. I do not attribute the using of this poor metal by the German Machine Makers to ignorance, but to the fact that prior to the War all the high quality metal in Germany was being used for Armaments.

(3) Owing to currency restrictions the German Spinners were only able to purchase very few British made machines, and thus they were unable to take advantage of the great development in preparing and spinning machinery in the years 1928 - 1939.

ROPE MAKING PLANT.

This is completely out of date although one or two Firms have introduced "Electric Travellers". It should be borne in mind that the Ropemaking Industry in Germany is very small compared to U.K.

PRE-WAR GERMAN OUTPUTS.

	Tons per year.
Sisal Binder Twine	45,000
Manila Ropes and Trawl Twine	6,000
	51,000

PRESENT POSITION - BRITISH ZONE ONLY.

Requirements.	Tons per year.
Paper Binder Twine	20,000
Ropes and Trawl Twine	Unknown

Manila is being used for Fishing Ropes and Trawl Twine, and as the Fishing Industry is now vitally important for feeding Germany, Military Government are giving every assistance to the German Spinners and Rope Makers in producing these goods.

Ropes for the German Shipping Industry are being made from European Hemp.

APPROXIMATE STOCK OF RAW MATERIAL HELD IN BRITISH ZONE, FEBRUARY 1946.

Manila	(mostly high grades).	450 tons.
Sisal		100 "
True Hemp.		1,200 "
		1,750 "

I estimate the potential as regards Plant in Germany to be sufficient to produce the Ropes and Trawl Twine for the essential demand in the British Zone, the governing factors being shortage of labour and raw materials.

BINDER TWINE.

Again here I estimate the Plant is sufficient to produce the requirements in the British Zone if the Binder Twine is made from Paper, but both labour and paper are in short supply, the Mills at present are only working single shift and being even then short handed. The supply of Swedish Natron Paper is the crux of the whole matter; the British Government I am told, have purchased 2,000 tons of Paper for The German Spinners.

It does seem a pity that German Kraft Paper is not suitable for Binder Twine, as this would relieve the raw material position right away. I did see CRASMOELLER OF NEUNKIRCHEN spinning Binder Twine from German Kraft Paper, but he was certainly having a lot of trouble.

Even if the Kraft Paper is unsuitable and Swedish Paper has to be used, the position would certainly be eased if all the German Spinners were ordered to copy the BREMER TAU-WERKE and spin the Binder Twine single ply 600' per lb. This not only would save material, but it would save labour and power which is COAL.

SISAL v PAPER BINDER TWINE.

The German Spinners are divided in their opinions on the question "has Paper Binder Twine come to stay?" They all agree that price of Raw Material is the governing factor, but whereas Tecklenborg of the Bremer Tau-Werke thinks the Farmers prefer the Paper Twine, the others maintain the Farmers prefer Sisal and will buy Sisal in preference to Paper providing the Paper Twine is only 10% cheaper than the Sisal Twine, any greater difference in favour of Paper and they will buy Paper.

As far as Germany is concerned I think the answer to this question is whether or not German Kraft Paper can be processed into a Single Ply Binder Twine 600' per lb.

If it can, and the Kraft Paper is comparable in price to Sisal then the saving in direct wages, power and repairs to plant, (which is negligible when spinning Paper) will make Paper Binder Twine a very serious competitor to Sisal.

HANFWERKE - FUSSEN, IMMENSTADT

IMMENSTADT WORKS.

PERSONS INTERVIEWED:-

Herr Director Maier.
Works Manager Zwerger.

DESCRIPTION OF FACTORY.

Hard and Soft Fibre Spinning, Line and Twine and small Rope Makers.

The works are on a good site with a private railway siding, and the motive power is electric, generated by their own water turbines. There is a stand-by steam plant with automatically fired boilers for generating the power should the water turbines fail.

This is the largest and best known firm of soft fibre spinners in Germany; another branch is located at Fussen.

PRE-WAR OUTPUT.

	Tons per annum.	
Sisal Binder Twine (595' per lb.)	800	
Sisal Cords, small Ropes up to 1¼" circ.	400	
Total Hard Fibre		1,200
Soft Hemp Binder Twine (664' per lb).	2,000	
Soft Hemp Yarns (4-8 lea).	2,500	
Soft Hemp Yarns (other sizes down to 25 lea).	500	
Total Soft Hemp		5,000
Total Output all Yarns		6,200

SOFT FIBRES USED.

80% Italian ex Northern Italy.
20% Hungarian and Yugoslavian and a very small quantity of Russian.
Production was 2/3 Line Yarns and 1/3 Tow Yarns.

Excluding Binder Twine the bulk of the Soft Fibre Yarn was made up into Lines and Twines and small Ropes.

EMPLOYEES - WAGES.

Females 810 @ 10.8 pence per hour.
Males 540 @ 14.4 " " " with certain piece-work wage earners @ 18 pence per hour.

HOURS WORKED.

Two shifts as under:-

Shift No.1
Monday to Friday 0600 - 1400 hours.
Saturday 0600 - 1200 hours.

Shift No.2

Monday to Friday 1400 - 2200 hours.

PRESENT POSITION

Stocks of Raw Material.

	Tons.
Sisal	Nil
Italian Hemp	12
Italian Machine Tow	12
German Flax Tow	9
Total	35
German Sulfit-Kraft Paper	35

PRESENT PRODUCTION

Very limited owing to shortage of raw materials. Only one shift worked (hours of Work 0700 - 1200 hours and 1330-1700 hours) and this may be stopped altogether if Raw Material is not forthcoming. No Sisal has been processed since 1939, Swedish Natron being substituted for Binder Twine and Sisal Cords, and today Swedish Natron Paper not being available, German Sulfit-Kraft Paper is being used. Under these conditions the labour supply has little bearing, but there is a shortage of girls between the ages of 16 and 30.

HARD FIBRE SECTION.

Difficulty was experienced in obtaining reliable information about their process methods, as (a) they had not processed Sisal since 1939, and (b) their Hard Fibre Manager had since retired. The present executives have a very scanty knowledge of Hard Fibre and its method of process.

The Plant consisted of:-

1 - 4½" pitch Long Reach Spreader.
1 - 4" " " " No. 2 Goods.
1 - 1½" " 88" Reach Single Head 1st. Drawing.
1 - 1" " 60" " " " Finisher.
1 - 24 spindle 60" Reach 10" x 6" Mackie Gill Spinner.
1 - 24 " 60" " 10" x 6" Seydel " "

The machines had no novel features, but the Spreader, which had a very short table, was fitted with 5 pair Horizontal Softener, and it was also fitted with a driven up-take motion.

The Management stated that the process for 595' per lb. Binder Twine was 2 passages of "Goods" and 2 passages of "Drawings". As the Management were extremely hazy on their pre-war methods it is our opinion that the process employed pre-war was 2 passages over each Goods Machine making 4 Goods Machine passages altogether and 2 passages of Drawings. By this latter method the system is a balanced unit.

Batch Oil.

Quantity applied unknown.
Method of application:- Gravity feed on No.1 Goods.
Batch oil was purchased ready made from AEROCIT-WERKE, WERDAU, SAXONY, (Russian Zone).

Cord Twisting.

All Hard Fibre Cords were twisted and not laid, one Mackie Auto Doffing Twister being used and the balance of the plant being old Automatic Spinning Jenny Heads, made by Seydel.

SOFT FIBRE SECTION.

Line Preparing.

Softening.

At the present time all the softening is carried out on three standard circular reciprocating softeners, one of which was fitted with "helical" fluted rollers. They were also equipped with three special softeners, described in Fig. (1). These however, were not popular. Appendix 'B'

Cutting.

7 Cutters of the standard type and supplied by Fairbairn Lawson in 1928. All the Hemp processed was cut and not broken.

Damper.

Coarse Hemps were sometimes damped by passing over a cold water spray.

Hackling.

13 standard type mechanised Hacklers by Liebscher of Chemnitz and Cotton of Belfast, 2 of which were fitted with Automatic Transferers and Spreaders.

Pinning.

Commencement	1 pin to 3".
Finished	24 pins to 1".
Tools per side	12.

Hackling Book Results.

These records were inefficiently kept and little attention seemed to be paid to the Line yields, but the following information was gleaned.

Size of Strick $9\frac{3}{4}$ ozs.
No. of Lifts per Min. 8.
Yield Given 45%.
Material used. High Grade Italian Hemp, (average S.B.). It was later learned at Fussen Works that this low yield was to some

extent accounted for by the fact that before hackling, the seed and root ends were cut off and used with Tow.

Preparing.

System was of normal design, hand spread boards being used. The spread boards had 5 channels and the spreading was very carefully done.

The fibre, when being prepared for yarn sizes up to 10 lea, being given 4 passages of Drawings 22" reach. Finer than 10 lea 5 passages of Drawings were employed.

Spinning.

2 - 96 spindle Mackie Gill Spinners 5⅛" x 2.5/16" bobbins.
2 - 88 " Seydel " " 5½" x 2¾" "

The balance of the spinning plant was completely out of date and of the Gill Roving Type.

"TOW"

2 - Breaker Cards.
36 - Full Circular Hopper Fed Finisher Cards.

Numerous Drawing Frames by various makers, the fibre being given 3 or 4 passages according to size of yarn to be spun.

WASTE RECOVERY.

Flax and Hemp Bale Rope Teazer.

This machine is really a "Devil Card", consisting of one down striking cylinder with 2 pairs of fluted feed rollers.

For Machine details see Fig. (2). Appendix 'C'

We saw this machine in operation, and it functioned in a very efficient manner.

Tow Shakers.

These machines, made by Liebscher of Chemnitz, consisted of a standard card hopper feed, from which the fibre passed to a grided platform 10' long x 4' wide, over the top of which was mounted a series of reciprocating hackle pins approximately 6" long, which shook out the dirt. The whole purpose of this machine was similar to that of a Tow Scutcher, thus to relieve the card of unnecessary work.

Dust Extraction.

The dust extraction was most efficient, and it was noticed that large trunking was employed with very powerful fans. In addition to the main extraction plant, there was a subsidiary with ducting to floor level, through which floor and card waste was drawn by suction direct to the Boiler House.

Twisting, Laying, Baling and Spooling.

There was nothing special about this, and in fact the whole plant was out of date by British practice.

Polishing.

The polishing machine was of standard design, and the pre-war dressing was -

20 kilograms Potato Starch.
1 - 5 " "Pearl Lime" (synthetic gum).
400 litres Water.

Judging from samples and from what we saw in practice, the polishing was not of a high standard.

FUSSEN WORKS.

Persons Interviewed:-

Herr Director Uhlich.
Tech Engineer Weiss.

DESCRIPTION OF FACTORY.

Soft Fibre Spinning, Line and Twine Makers.

The works which were established in 1861 stand on the River Lech from which their water turbogenerators are driven, consist of well constructed buildings. A modern steam plant is installed for heating and process purposes only.

PRE-WAR OUTPUT.

Soft Hemp Binder Twine (Line and Tow)	100	tons
Soft Hemp Lines, Cords, etc.	2,100	"
Soft Hemp Yarns.	3,000	"
Synthetic Fibre Yarn.	75	"
Total	5,275	"

Production was 60% line and 40% tow and the fibre used was practically all Italian Hemp.

The finest yarn spun was 16 lea and the heaviest yarn spun was Binder Twine running 740 ft. per lb. The bulk of their production was 3½ to 8 lea.

EMPLOYEES - WAGES.

Females 560 @ 12 pence per hour on piece work.
Males 690 @ 16¾ " " " " " "

HOURS WORKED.

1 48 hour shift per week.

PRESENT POSITION.

Stocks of Raw Material:-

Hemp and Flax Fibre	2	tons.
Hackled Line.	50	"
Scutched Tow.	190	"
Machine Tow.	30	"
Artificial Fibre	23	"
Paper for Twines etc.	150	"
Paper for Binder Twine	50	"
Total	495	"

Anticipated receipts amount to 122 tons, 50% of which would be for Binder Twine.

PRESENT PRODUCTION.

The position is the same as at Immenstadt except that there would be no shortage of workers. They expect to receive limited supplies of Cotton Yarn from America for twisting into Binder Twine. They could handle 28 tons per month.

LINE PREPARING.

No novel features were incorporated in the preparing and spinning, the mill being commissioned as under:-

Softening.

10 Reciprocating Softeners.
11 Cutters.
1 Wetting Machine.
1 72 pair horizontal fluted softener.

Hackling.

22 Cotton Mechanical Hacklers including 4 with automatic transferers and spreaders. These 4 machines had 14 tools per side against 12 for the others.

The pinning commenced ½ pin per inch.
finished 24 pins per inch.

The average yields obtained were as follows:-

Good quality Italian Hemp	45%	(including root and seed ends cut off).
Retted Flax	65%	
Natural Flax	45%	

Preparing.

The preparation for all wet spinning was over three drawings; for dry spinning 1 and 2 lea, 3 drawings.
3 to 10 lea, 4 drawings.
10 to 16 lea, 5 drawings.

Spinning.

The Spinning Mill was commissioned with all types of frames, the auto doffing Gill Spinners by Mackie being outstandingly the best. The German made machines were equipped with a temper band and weight and the auto doffing frames were of poor design.

TOW PREPARING.

Breaking and Carding.

4 Breaker Cards.
36 Hopper Fed Finisher Cards.

Preparing.

The finest dry spun tow yarn spun was 8 lea prepared over 4 drawings; dry spun tow yarns heavier than 4 lea only received 2 drawings and were gill spun.

The wet spun yarn received 4 drawings and was spun down to 12 lea.

Spinning.

The tow spinning in quality of machinery, was if anything, inferior to that of the line.

TWISTING, LAYING, BALLING AND SPOOLING.

The whole plant was of normal design and largely out of date.

POLISHING.

The situation in this department was similar to that at Immenstadt works, and the starch mixture was the same.

WASTE RECOVERY.

This was on similar lines to that employed at Immenstadt.

DUST EXTRACTION.

As at Immenstadt this was very efficient. The softening room was 70 ft. x 270 ft. x 18 ft. and held the machinery listed above. There were two systems of ducting each exhausted by a 10 ft. fan.

BINDER TWINE AND CORDS MANUFACTURED FROM PAPER AT IMMENSTADT AND FUSSEN WORKS.

In general technique and practice these people were a long way behind the German Spinners in Bremen and Wiedenbruck. Whereas the Bremen Tau-Werke Fabrik spun a single ply Paper Binder Twine 600' per lb, Hanf-Werke Fussen and Immenstadt are spinning a 3 ply Paper Twine 432' per lb. with a slightly lower breaking strain (average 40 lbs.).

The 3 ply twine, after twisting, was only dried, whereas the spinners in North Germany, dry, polish with wax and crimp. This lack of polishing and crimping explains the reason why, to give elasticity, Fussen have to spin a 3 ply twine at a very much increased cost.

During the War Swedish Natron Paper was used, but now is no longer available, and German "Sulfit" Paper is being substituted, and is not as satisfactory. The price of Sulfit Paper is the same as Natron Paper, i.e. £40-£45 per ton.

The average annual production of Paper Binder Twine during the War was 1,000 tons, but in addition at Fussen Works 700 tons of Paper was processed into packing twines per year.

PURCHASE OF FIBRE.

The company have their own office in Bologna through which all supplies of Italian Hemp were purchased, and the Hemp is transported direct by rail, from Italy.

TRADE ASSOCIATIONS.

It was learned that pre-war, the German Soft Fibre Spinners had a Trade Association which fixed prices with headquarters in Berlin. Selling prices were fixed for the entire German industry.

GENERAL SURVEY.

The impression gained was that this firm used only high quality material which would justify the use of more efficient methods than those employed.

The rooms were large, well lit and ventilated and ideally suited for a proper layout. This however, had not been achieved.

The amenities for the workers were quite good and it was especially noted that no girl under 16 was employed.

The idea for training young operatives was good but had not been brought into force. The intention was to have a school for learner spinners under the direction of a skilled woman instructress.

Both works were equipped with efficient fitting shops which were not only capable of maintaining the plant, but could undertake a certain amount of development work.

MECH BINDFADEN FABRIK, OBERACHERN, BADEN.

PERSONS INTERVIEWED:-

Director Kroee.
Sales Manager Stegen.

The Director could not speak English, and the Sales Manager acted as an interpreter.

DESCRIPTION OF FACTORY.

Soft Fibre Spinning, Line and Twine Makers.

The business was established in 1875, and it appeared that the most successful trading years were those just prior to 1914 when the yearly output was just over 1,000 tons. In the years prior to 1939 the output was approximately 800 tons per year.

The buildings for the most part are old fashioned and the plant is housed in smallish rooms.

The motive power is electric generated mostly by steam, a maximum of 180 h.p. being obtainable from a water turbine, the maximum load being 1,000 h.p.

PRE-WAR OUTPUTS PER YEAR.

Italian Hemp Yarns (from 8 - ½ lea) 800 tons, a large proportion of which was 2 ply Binder Twine 750' per lb.

FIBRES USED.

Mainly very high grade Italian. 60% Tow. 40% Line.

FINISHED GOODS.

Excluding Binder Twine the yarn output was made up into Soft Hemp Lines, Twines and Plaited Cords.

EMPLOYEES - WAGES.

120 men @ 12½ pence per hour.
120 women @ 9¾ " " "

HOURS WORKED

1 - 48 hour shift per week.

PRESENT POSITION.

Stocks of Raw Material:-

50 - 60 tons Italian Hemp and Tow (high grades).

This firm is not only short of raw material, but labour is also in short supply, and the management say that the workers take the line of "No Food - No Work".

During the War the Binder Twine was spun from Paper, and today a small quantity of Paper is still being processed.

LINE PREPARING.

Only two Hackling machines, made by Liebscher of Chemnitz, one of which was fitted with an automatic transferer and spreader.

Details of Machines.

Pinning start at ½ pin per inch
finish at 18 pins per inch.

Number of tools 12.

Yield.

45% line (root and seed ends cut off).

Preparing.

As per British practice.

Spinning.

Both Gill and Breast Plate methods employed and it appeared that for the finer counts the latter method was used.

The Gill Spinners were of German manufacture, some of which were fitted with a novel auto doffing arrangement.

The platforms of full bobbins, after lowering to clear the flyers, were turned through an angle of approximately 180°, thus allowing the full bobbins to slide off the dead spindles. The platform was then reversed through 90° to bring the dead spindles into line with the bore of the empty bobbins which were already in position in a grooved rack.

The grooved rack was then moved inwards, and the bobbins slid on to the "dead spindles". The platform was then revolved into its original position. This design could in no way be compared for efficiency to British design.

"TOW".

Preparing.

2 Breaker Cards.
9 Hooper Fed Finisher Cards.

Drawings.

As per British practice.

Spinning.

Similar to Line spinning.

Twisting.

Completely out of date.

Cabling.

1 - 8" x 4" 12 spindle modern machine.

Braiding.

5 - 8 carrier "standard" type made by Guido Horn, Berlin/ Weisensee.

These machines looked a precision job and it was noted that the carrier wheels were made from a plastic material.

Polishing.

10 British type Drum Polishers with bobbin sizes ranging from 10" x 5" to 5" x 4".

The management were dubious about their starch mixture, but the main ingredients were potato starch and china clay.

Waste Recovery.

Not efficient.

Dust Extraction.

The preparing machines were fitted with individual dust extraction units, made by Franz Georg Niebuhr of Breslau. The dust laden air was drawn into a large chamber situated underneath the machine. The heavier particles of dust settled in the chamber and the remainder was passed through the fan to a small filter situated above the machine. The only advantage of this system is that it obviated the necessity of taking up considerable space with large trunking.

Purchase of Fibre.

The fibre was purchased direct from Hemp Brokers in Italy.

PAPER BINDER TWINE.

During the War this firm spun a single ply twine from Swedish Natron Paper 460' per lb. manufacturing 300 tons per year.

At present, as they are denied Natron Paper, they are using German Sulfit Paper, and as this is inferior to Natron Paper, they are having to make the Binder Twine 2 ply 450' per lb. giving a B/S of 44 lbs.

The method of spinning the paper yarn was very efficient, the paper being spun and spooled in one operation. For details see Fig. (3). Appendix 'D'

After spooling the paper was dried and polished in one operation on an ordinary twine polisher.

HANF-UNION. A/G. SCHOPFHEIM.

PERSONS INTERVIEWED:-

Herr Director Maisel.
Herr Director Eckart.
Herr Roepke - French Correspondent to the Chamber of Commerce.
Dr. Zills - a Lawyer, who was a son of one of the main shareholders.

The two Directors could not speak English, and Herr Roepke and Dr. Zills were called in to act as interpreters.

DESCRIPTION OF FACTORY.

Soft Fibre Spinners, twine line and small Rope-Makers.

Pre-war a small quantity of Sisal Binder Twine was also spun.

The business was established in 1921, the capital being 1.9 million marks = £190,000 at 1939 Rate of Exchange.

The buildings, which are very substantial, are in first class condition, but the dimensions of the main mill, which housed the entire soft fibre plant, being 2 bays 54" wide each x 380' long x 18' to the eaves.

The motive power is electric, supplied from "The Mains".

PRE-WAR OUTPUTS PER YEAR.

Total Soft Fibre Yarns	2,000 tons.
The most common size being 4 lea.	
Heaviest yarn spun ½ lea.	
Finest yarn spun 8 lea.	
Sisal Binder Twine.	360
	2,360

FIBRES USED (soft hemps).

Mainly very high grade Italian, Yugoslavian and Hungarian being reserved for low qualities. 60% Tow. 40% Line.

Sisal Mexican and British East African.

FINISHED GOODS.

Excluding Soft Hemp Binder, the yarn was made up into Twines, Lines and Small Ropes.

EMPLOYEES - WAGES.

170 Men @ 16½ pence per hour.
330 Women @ 12 " " "

HOURS WORKED.

2 - 8 hour shifts per day plus Saturday mornings.

PRESENT POSITION.

Stocks of Raw Material.

At works practically nil, 400 tons of Italian Hemp having been seized by the French for reparations.

All raw materials including "Sulfit" Paper are now issued by the French Authorities at Badenweiler.

This firm is favourably situated as regards labour and the only restriction to production is raw material shortage.

At the moment the works are working 1 - 40 hour shift per week.

LINE PREPARING.

5 - Circular Softeners.
5 - Double Sided Cutters.
6 - Hacklers by Liebscher of Chemnitz.

Details of Hacklers.

5 - 12 tool machines.
1 - 14 " "

Pinning start at 1/6 pin per inch.
finish at 18 pins per inch.

Above was the pre-war setting and the yield was stated to be 40%. Now, however in order to increase the yield, the last two tools of each side of all the Hacklers have been removed, so that the Pinning now finishes at 12 pins per inch. By doing this the yield has been increased to 45%.

As is common in German practice the root and seed ends were cut off before hackling.

Preparing and Spinning.

The machinery was of the usual German type, but with few exceptions turn tables were not fitted to the Drawing Frames, and the handling of the fibre left a lot to be desired.

TOW.

2 Breaker Cards.
11 Hopper Fed Finisher Cards.

Drawings.

As in the Line system.

Spinning.

Both Gill Spinners and Breast Plate.

Twisting.

Completely out of date.

Line Walk.

One 60 fathom well laid out Walk capable of making a rope up to $2\frac{1}{2}$" circumference.

The Walk was all electric, the traveller being driven by a small motor, which picked up its power from overhead cables. The Traveller was a 21 hook machine, the hooks being arranged in one row.

All ropes made on this walk, were unpolished.

Polishing.

10 British type Drum Polishers, with bobbin sizes 10" x 6" and 9" x 4".

The pre-war starch mixture was an emulsion containing paraffin wax, olive oil soap, china clay, potato starch, Dextrin and glue.

Waste Recovery.

Very poor.

Dust Extraction.

While this appeared to be efficient, the system was very cumbersome, large filters being located in the middle of the Mill.

Purchase of Fibre.

The fibre was purchased direct from Brokers in Bologna and Ferrara, and transported by rail to the works at which there is an excellent siding.

PAPER BINDER TWINE.

During the War 600 tons of Paper Binder Twine and 360 tons of Paper Packing Cords were processed per year.

The best Paper Binder Twine was a single ply twine 460' per lb. made from Sulfit Paper.

After spinning the twine was dried and polished. The method of spinning was on the same principle as that employed by Mech Bindfaden Fabrik of Oberachern, but the spinning discs were only 8" diameter x $\frac{7}{8}$" deep, rotating at 1200 R.P.M.

SISAL BINDER TWINE.

This was only started a few years before the War, and it was obvious that their methods were completely inefficient.

The plant consisted of:-

2 long Reach Goods Machines by Liebscher.
3 " " Drawing Frames " "
2 56 spindle 8" x $5\frac{1}{2}$" Gill Roving Frames by Mackie.

No turn tables, pad pilers or lifting out creels were fitted to the Goods Machines or Drawing Frames.

GENERAL SURVEY.

The Buildings were excellent and the lay out good and it was a shame to see such good fibre wasted on inefficient machinery and by careless handling.

Method of Equating Dressed Line Values.

The Tow cast was valued in three grades, the best being priced at the delivered price of the hemp. No. 2 grade was 13% lower in price and No.3 grade 15% lower than the hemp price in both cases.

The total value of the tow produced was deducted from the total value of the hemp used plus the cost of hackling. The difference was taken as the value of the line produced.

J. H. BEK & CO. HANFSPINNEREI & SEILFABRIK,

SINGEN, HOHENTWIEL, BADEN.

PERSONS INTERVIEWED:-

Herr Director Bek.
Herr Director Kroll.

DESCRIPTION OF FACTORY.

Sisal Binder Twine Spinners, Hard Fibre Rope Makers up to 6" circumference.

The business was established in 1906 by Bek's Father and Kroll.

The buildings are poor, and the general lay out of the Factory leaves a lot to be desired.

The motive power is electric purchased from the Grid.

PRE-WAR OUTPUTS PER YEAR.

Sisal Binder Twine (600' per lb. B/S. 100 lbs.)	1,000 tons.
Manila Rope, general purposes.	200 "
" " square transmission ropes.	200 "
	1,400

FIBRES USED.

No. 1 E.A. Sisal and Java.
Manila G grade and better.

EMPLOYEES - WAGES.

90 Women @ 16¼ pence per hour.
30 Men @ ? ?

HOURS WORKED.

2 - 8 hour shifts per week including Saturday mornings.

PRESENT POSITION.

Stocks of Raw Material.

Hard Fibre nil, (stock of Sisal Rope Yarn of 10 tons).

All Raw Materials including Sulfit Paper are now issued by the French Authorities at Badenweiler.

During the War soft fibre was processed over the hard fibre system, and on their own admission a very unsatisfactory job was made.

Labour at the moment is in very short supply.

HARD FIBRE PREPARING.

Batch.

Sisal Binder Twine 10 - 12% Pure Mineral Oil.

Manila. - A Mineral Oil Emulsion purchased from Dirch and Schroeder of Bremen.

The batch was applied on 1st. and 2nd Goods Machines.

Description of System

3 passages of Goods Machines.
5 " " Drawings - for Binder Twine.
4 " " " - for ordinary Rope Yarn.
No. 1 Goods 4½" pitch of bar 23" width of gill, long reach by Seydel.
No. 2 & No. 3 Goods 4" pitch of bar 23" width of gill, long reach by Seydel. The above were fitted with 33" dia. turn tables.

No. 1 and No.2 Drawings were single head machines, 1½" pitch of screw, 88" reach, but fitted with 8" dia. Drawing Rollers and 20" dia. Pressing Rollers. The first Drawing was fitted with the old fashioned type doubling plate, doubling the slivers 4 into 1.

No. 3 Drawing was a double head machine, $1\frac{1}{4}$" pitch of screw, 60" reach.
No. 4 Drawing was a single head machine, $1\frac{1}{4}$" pitch of screw, 52" reach, 4 pins per square inch.
No. 5 Drawing was a single head machine, 1" pitch of screw, 52" reach, 4.1/3 pins per square inch.

All the above Drawing Frames were made by Beckmann of Bielefeld.

Spinning.

1 - 48 spindle 10" x 6" long reach (individual drive to each spindle) Auto Doffing Gill Spinner by Liebscher.
1 - 48 spindle 10" x 6" long reach Auto Doffing Gill Spinner by Mackie.
1 - 16 spindle 10" x 8" 48" reach Auto Doffing Gill Spinner by Liebscher.

Two sizes of Rope Yarn were spun, i.e. 324' per lb. and 520' per lb. the former being used for square ropes.

Twisting.

1 - 24 spindle 10" x 8" (not auto doffing) by Seydel.
5 - 2 " 10" x 8" Automatic Heads by Beckmann.
2 - 2 " 23" x 6" very old fashioned Twisting Machines.

ROPE MAKING.

Square Rope Machines.

2 - 8 bobbin (18" x 21") Machines, dimensions of each machine - 18' diameter x 15' high, (excluding the haul off gear).

These machines were capable of making Ropes up to 2.16" square in lengths of 250 fathoms.

The Ropes were stretched after manufacture. In the main these Ropes were made for the Ruhr Coal Mines, the Ropes being spliced and fitted by skilled men employed by J.H. Bek.

The strands for the above machines were made on a large type "Snake" machine, taking 120 bobbins.

J.H. Bek claimed to be the foremost manufacturer of square ropes in Germany.

GENERAL PURPOSE ROPES.

The Ropes were made on house machines, which were of a very old type. The closing machines were of vertical design, and the Directors stated the production was 8 cwts. per 8 hours per machine when making 3" circumference rope.

PAPER BINDER TWINE.

During the War a single ply Paper Binder Twine was spun from Swedish Natron Paper. The details of the twine were, runnage 463' per lb., B/S 55 lbs. In 1943 780 tons of this twine was produced, which was their peak year.

At present they are producing 300 tons per year of Binder Twine made from Sulfit Paper. This twine is single ply 463' per lb., B/S 38½ lbs.

The paper is spun on the Hard Fibre Gill Spinners and it was noticed that the paper passed over a block of wax before entering the Drawing Rollers.

After spinning the paper is polished, dried and crimped in one operation.

AKTIENGESEILSCHAFT FUR SEILINDUSTRIE,

NECKARAU, MANNHEIM.

PERSONS INTERVIEWED:-

Herr Director Hofman.
Herr Director Paul Bartels.
Herr Karl Gramlish. (Manager of
Binder Twine Department).
Herr Theodre Gramminger. (Sales Manager).

DESCRIPTION OF FACTORY.

Sisal Binder Twine Spinners, Manila Rope Makers, Soft Hemp Spinners and Wire Rope Makers.

The business was established in 1830 and is a limited company, the capital being 2,100,000 marks, which at the pre-war rate of exchange of 10 marks to £1 = £210,000.

The buildings were nearly all two storied, but the lay-out was good with a private railway siding running right through the length of the works.

The motive power was partly electric, generated by their own plant; and partly steam.

WAR DAMAGE.

Very considerable, at least 60% of the works being destroyed. This occurred in one night attack on 9th August 1943. The damage was entirely due to fire.

PRE-WAR OUTPUTS PER YEAR.

Sisal Binder Twine (runnage 670' per lb.)	3,000 tons.
Sisal Packing Cords (extra fine)	2,000 "
Manila Ropes (up to 8" circ.)	250 "
Sisal Square Driving Ropes.	250 "
Italian Hemp Rope	200 "
Soft Hemp Yarns (for twines and packing cords)	1,500 "
Flat Rope Driving Belts.	36 "
	7,236 "
Wire Ropes	1,000 "
	8,236 "

RAW MATERIALS USED.

Binder Twine and Packing Cords.

British East African and Java Sisals.

Manila Ropes.

High Grades from Streaky 3 upwards.

Soft Hemps.

Mostly Italian, and some Yugoslavian and Hungarian.

Roping Wire.

Wire Mills in the Ruhr, and high qualities from British Manufacturers.

EMPLOYEES AND WAGES. PRE-WAR.

500 Women @ 12 pence per hour.
250 Men @ 16 " " "

HOURS WORKED.

Sisal Binder Twine and Sisal Cords.

2 - 8 hour shifts per day plus Saturday mornings.

Remainder.

1 - 48 hour shift per week.

PRESENT POSITION.

Stocks of Raw Material.

Hard Fibre	Nil.
Italian	30 tons.
Paper	Nil.
Wire	Very little.

Owing to the War damage and shortage of raw materials there is little chance of this firm becoming a producing unit of any scale for a long time to come. However, the management stated that they hoped to obtain 100 tons of Cotton-yarn per month from German Mills which they would process into Binder Twine. The details of this twine are:-

Runnage - 750' per lb.
B/S. - 44 lbs.

HARD FIBRE PREPARING.

Sisal Binder Twine.

War Damage. Nil.

Description of Plant.

The machinery was of a mixed origin and was completely out of date. Not only were no turn tables and pad pilers fitted but the machines themselves were pre 1900 design.

The Mill was commissioned with two systems, and the Binder Twine was prepared over 4 passages of Goods Machines and 4 passages of Drawings.

Batch.

Purchased from Rudolf Fuchs Hamburg and applied on No.1 and No.2 Goods Machines.

Spinning.

120 spindles of Automatics 10" x 8" bobbin.
2 - 40 spindle 10" x 6" Long Reach Gill Spinners by Seydel.

Spooling.

Several "Ayrton" type spooling machines.

EXTRA FINE SISAL CORDS.
(Finest Yarn spun 2,000' per lb.)

War Damage Nil.

Description of Plant. (Preparing).

As for Binder Twine.

Batch.

Purchased from Dirch and Schroeder of Bremen.

Spinning.

Several Gill Roving Frames 10" x 6" bobbins.

Twisting.

Converted Automatic Heads.

Polishing (Plant completely destroyed).

Details of pre-war plant.

3 - 2 spindle Sisal Cord Polishers by Klein Baumhauter of Minden. The management claimed these to be efficient machines, but owing to records being destroyed, could not give us their starch mixture, which was bought from an outside source.

The production of these machines was 10 cwts. per 8 hours per machine on a cord running 600' per lb.

MANILA ROPE YARN.

War Damage Nil.

Description of Plant.

One system similar to the Binder Twine systems.

Batch.

As for Binder Twine.

Spinning.

2 - 24 spindle 10" x 8" long Reach Gill Spinners - one by Seydel and one by Liebscher.

ROPE WALK.

2 Walks. 160 fathoms long, which were completely destroyed. One walk was a standard heavy set of machines by Combe Barbour.

HOUSE MACHINES.

Completely destroyed, but machines which were few in number were very old.

SQUARE ROPES.

Max. size $1\frac{3}{4}$".

War Damage Nil.

(These were both of ordinary strand and rope strand construction).

Stranding.

Bulmer type Formers and Closers.

Plaiting Machine.

1 - 8 carrier machine (24" x 18" dia. bobbins) with overhead haul off gear, the finished rope being coiled on to a large drum.

1 - 8 carrier machine (36" x 12" dia. bobbins) with overhead haul off gear, the finished rope being coiled on to a large drum.

During stranding the ropes were impregnated with wool grease.

After manufacture the ropes were stretched as per fig. (4). Appendix 'E'

When supplied to the customers all ropes were fitted and spliced by the firm's employees.

FLAT TRANSMISSION ROPES.

Material used was 20 ply Cotton Yarn which was plaited into a Flat Rope on a multiple carrier Plaiting Machine.

The maximum width made on the above machine was 2½" x approximately ½" thick. These widths were then sewn together with a packing type needle, up to widths of 78". The bands were then long spliced by hand, stretched and impregnated on what looked like a very large type drum dresser.

SOFT FIBRE MILL.

This was completely destroyed, but what machinery was left appeared to be completely out of date.

PAPER BINDER TWINE.

During the War single and two ply paper binder twine was spun from Swedish Natron Paper. The runnage of the twine in both cases was 460' per lb., B/S. 55 lbs. The maximum output produced in one year was 2,000 tons. The 2 ply twine was spun and twisted in one operation on converted automatic heads. It should be noted that both the yarns and the finished twine had a right hand twist.

The twine was then dried, polished with wax and crimped in one operation. The drying was carried out by hot air.

The War damage to this department was nil.

WIRE ROPE.

War damage very considerable, but they had saved the following machines, some of which appeared to be quite modern and in good order:-

Stranding.

1 - 12	bobbin	3½" x 6¾"	horizontal "Snake" machine,	speed 500 rp.m.
1 - 12	"	5¾" x 9½"	" " "	speed 400 rp.m.
1 - 6	"	5¾" x 9½"	" " "	speed 400 r.p.m.
1 - 12	"	3½" x 6¾"	Vertical Strander, 3 heads	per frame.
2 - 18	"	5¾" x 9½"	" " " "	" "

The vertical stranders were made by Sistig of Dusseldorf, and the output of 3 heads was stated to be equal to that of one "Snake", and the labour cost double.

Closing.

2 Bulmer type Closers.

Winding.

Nothing special about this and they stated the wires were butt welded.

Constructions

6/19, 6/37, 6/61, and also non-rotating plaited Wire Ropes.

Cores.

Pre-war. Jute, Hemp and Sisal, and to-day a certain amount of Paper. The lubricant used was Petroleum Jelly or Stockholm Tar, and the cores were stated to be dipped.

PURCHASE OF RAW MATERIAL.

Hard Fibres	British Brokers	Hemp bought C.I.F. Hamburg.
Java Sisal	Dutch Brokers in Amsterdam.	

GENERAL SURVEY.

This firm, which is a very large establishment, covering an area of 16 acres, appears not to have kept abreast of the times in any one of its manufactures.

GENERAL IMPRESSIONS OF GERMAN METHODS AND TECHNIQUE.

The general impression gained was that while the standard of efficiency regarding the processing of soft fibres was higher than that in the processing of hard fibres, it was still a long way behind British manufacture.

It was very noticeable that although high quality fibre was used, the available machinery was not employed to the best advantage, and the finished product was of poor quality. This may be due to War weariness, but it is our opinion that having studied the production records, the German Manufacturers never were efficient and could not successfully have competed with British Manufacturers.

Amenities for Workers.

On the whole these were quite good; in the larger factories Canteens and First Aid Rooms were available. The safeguarding of machinery, however, was very lax.

Office Accommodation.

This was quite first class.

OTHER GERMAN SPINNERS.

MECH TAUWERKFABRIK E SCHUIRING & CO., WESERMUENDE, BREMEN, (U.S. Enclave).

Closed down pre-war.

J.W. KROENER, AUGSBURG. (U.S. Zone).

Closed down pre-war.

VEREINIGTE TAUFABRIKEN G.M.B.H. EMMERICH. (Branch of United Ropeworks of Rotterdam). (British Zone).

Sisal Binder Twine Spinners - completely bombed out. Now trying to obtain permission to re-build.

INTERNATION HARVESTER CO., NEUSS. (British Zone).

Sisal Binder Twine Spinners. Pre-war output 3,500 - 4,000 tons per year.

Bombed to a certain degree. Present estimate possible capacity if labour and material is available 1,500 tons per year (2 - 8 hour shifts per day).

GUSTAV THIEMANN & SOHNE G.M.B.H. RHEINE (British Zone).

Sisal Binder Twine Spinners. Partly destroyed in the War.

WOLTEMADE & SOHNE STADTE (Near Kiel). (British Zone).

Small Firm. Sisal Binder Twine Spinners and Manila Rope Yarn Spinners.

I.M. SCHLESINGER BEDZIN POLAND.

Sisal Binder Twine and Manila Trawl Twine.

ALOIS WOETZL LINZ, AUSTRIA.

Wire Rope Makers. Small outputs of Sisal Binder Twine and Packing Cords.

MECH-SEILER, WARENFABRIK, BALBURG. (U.S. Zone).

Soft Fibre Binder Twine Spinners. Output - approx. 2,000 tons per Annum.

SCHLOTHEIM AREA. (Russian Zone).

There are about 12 firms in this area, all of whom, pre-war, spun Sisal Binder Twine.

The two largest concerns are:-

MULLER AND WIMMER.
ERNST LAUBE.

The above two firms employed about 200 workers each.

VEREINIGTE - JUTE SPINNEREI AND WEBEREI. (U.S. Zone).
HERZFELD, HESSEN.

Pre-war Jute Spinners and Weavers. Now working paper and hemp.

ALLGUAR, BAUMWOLLSPINNEREI U WEBEREI, BLAICHACH, NR. IMMENSTADT (U.S. Zone). Cotton Spinners.

FELTON & GUILLEAME (American Zone). SCHREDZHEIM, NR. DILLINGEN.

Small Soft Fibre Spinners, who also make a small quantity of Wire Rope.

EBERBACHER DAMPFSEILERWARENFABRIK, OTT SIEBECK EBERBACH, NEAR HEIDELBURG. (U.S. Zone).

Sisal Binder Twine Spinners. Output 1,000 tons per year.
Also make Labourers Boots.

AUGUST GREVE KOM GES LINDAU, LAKE KONSTANZ (French Zone).

Small firm. Jute and Soft Hemp Spinners.

J.H, HACKMANN HALLE. (Russian Zone).

Very small firm. Soft Hemp Spinners.

MECH. SEILERWARENFABRIK GUSTAV LORENZ ANNABERG I/ERZEBIRGE (Russian Zone).

Very small firms of Rope and Net Makers.

SEILWERKE HEINR PUTH, BLANKENSTEIN, RUHR. (British Zone).

Large firm. Sisal Binder Twine Spinners, Wire and Hemp Rope Makers.

F. & H. Ralenkotter, WIEDENBRUCK, HANOVER (British Zone).

Small firm of Binder Twine Spinners. Output 800 tons per year.

THOMAS SONTHE MER MECH TRIEBRIEMENWEBERGI AND SEILFABRIK, WEINGARTEN, NR. STUTTGART.

Very small firm of Binder Twine Spinners.

H.G. Fischer G.M.B.H. TAUWERKFABRIK, STETTIN-GRABOW (Russian Zone).

Very small firm of Sisal Binder Twine Spinners and Ropemakers.

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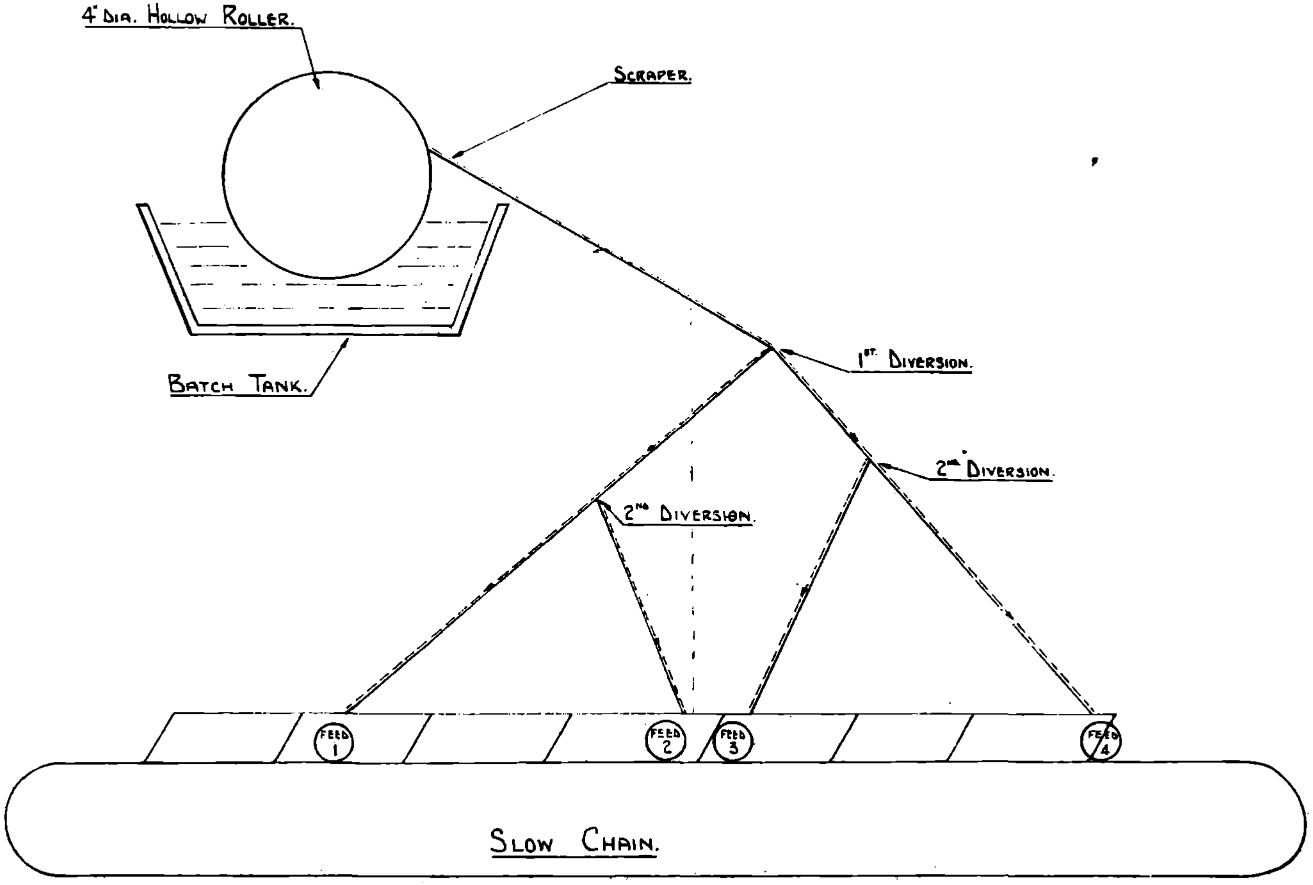
APPENDIX 'A'

See Page 11.

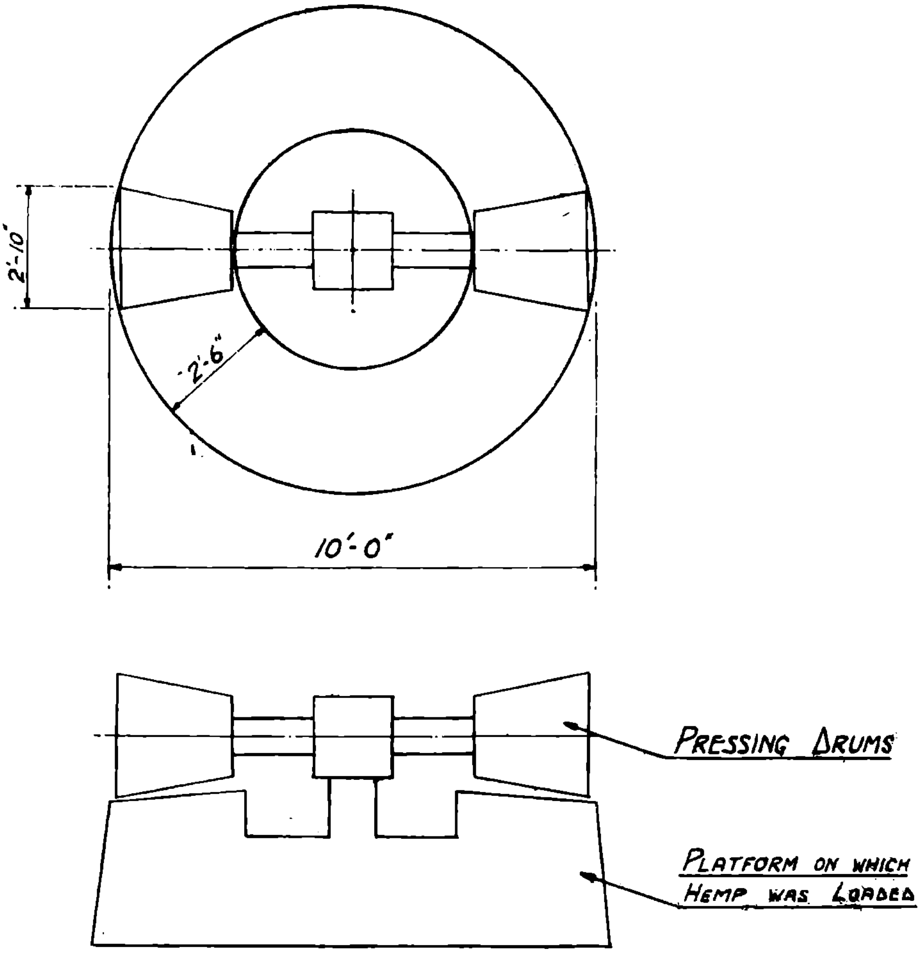
Bremer-Tau-werke Fabrik.



SYSTEM OF BATCH APPLICATION
TO No. 1 & No. 2 GOODS MACHINES.

APPENDIX 'B'

See Page 41.

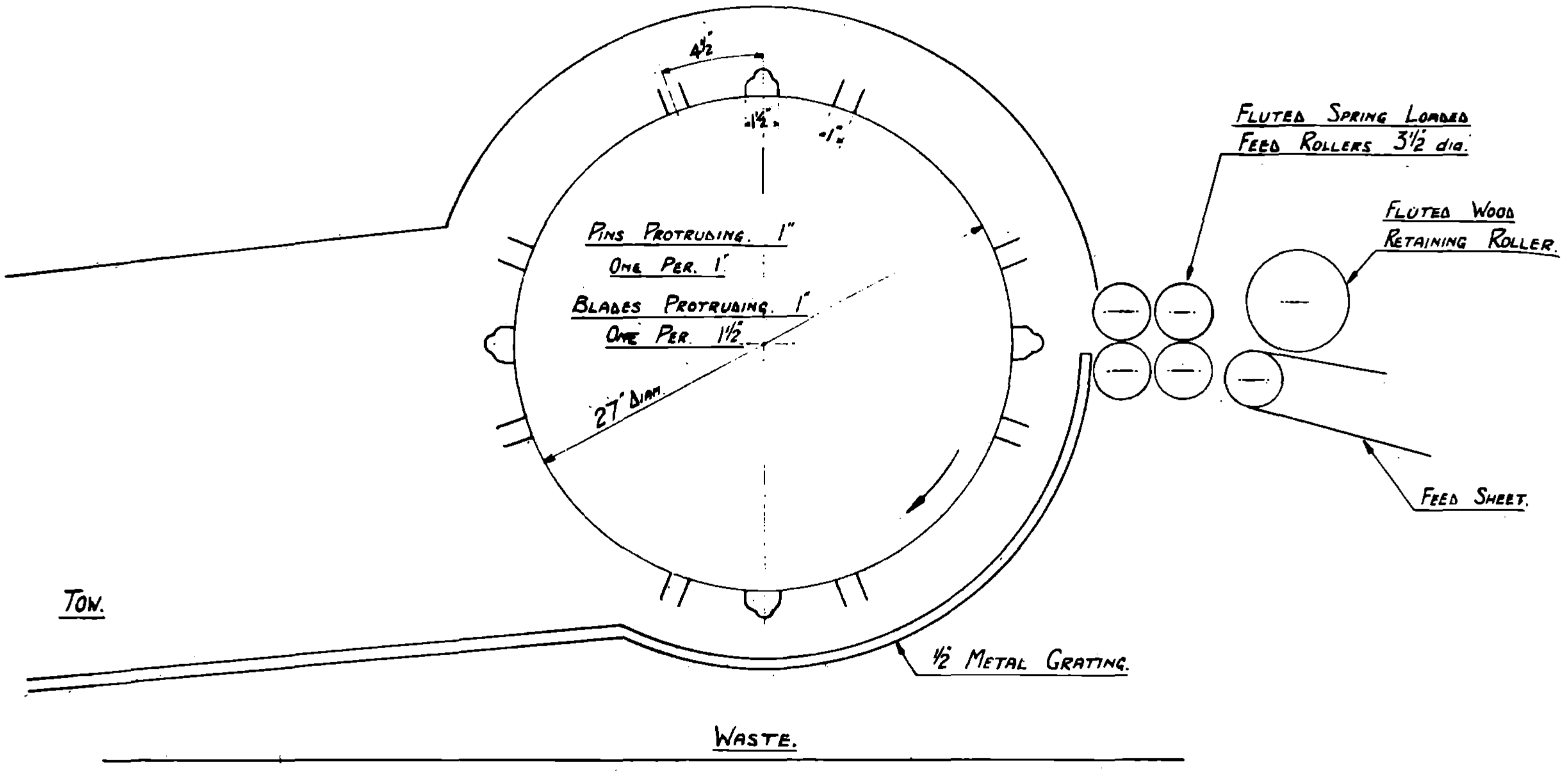


OUTPUT 10 CWTS. PER 8 HRS. WITH 2 OPERATIVES.

HEMP SOFTENER. FIG. 1.
HANFWERK FÜSSEN IMMENSTADT.

APPENDIX 'C'

See Page 42.



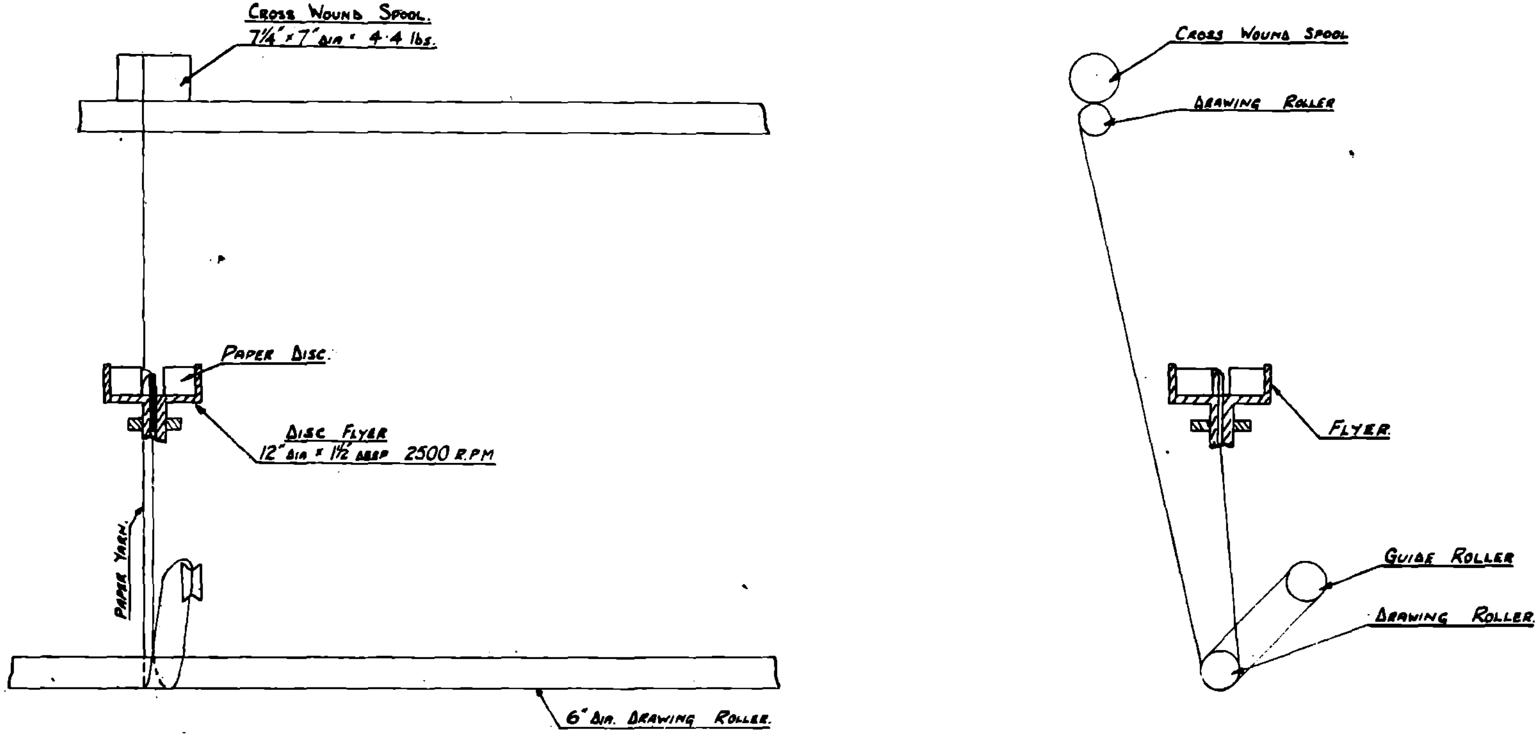
TEASER. FIG. II

HANFWERK FÜSSEN IMMENSTADT.

APPENDIX 'B'

See Page 52.

Mech Bindfaden Fabrik Oberachern, Baden.



Front Elevation. Fig III.

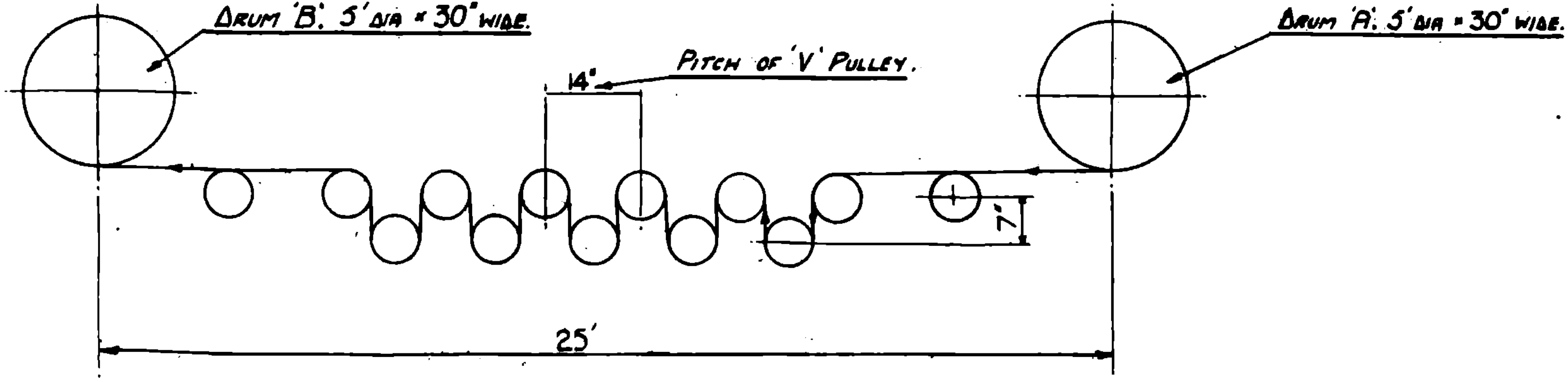
Side Elevation Fig III.

Sketch of Machine for Spinning and Spooling Paper Yarn in One Operation.

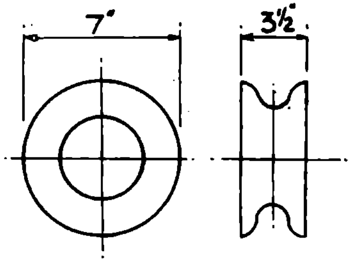
APPENDIX 'E'

See Page 66.

**Aktienge Seilschaft Fur Seilindustrie,
Neckarau, Mannheim.**



Both Drums 'A' & 'B' are Positively Driven from a Common Shaft
Drum 'A' Having a Surface Speed Lead to Impart the Stretch.



Sketch of 'V' Pulley.

SQUARE ROPE STRETCHING MACHINE FIG. IV.